

**Senior Design Executive Summary**

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# *Senior Design Team Members*

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# Project Description

## Vision

Spreetail was looking for a hardware and software solution to provide consistent, high quality photography of products. Studies show that customers are 60% more likely to buy products that have high quality photos. The current photography process is very slow and time consuming, involving photographers to capture all images manually. Spreetail wanted a more automated solution that involves taking photos of products rotating on an electric turntable from two different angles. They also wanted a front end that would allow a user to control this capture process. Overall, the solution should provide images of a product that is rotating on the turntable, giving Spreetail images from many different angles.

## Project Vision Changes

Originally, along with the vision mentioned above, Spreetail wanted the pictures that were taken to be processed into a 360 image of those photos. They also wanted this to be integrated into Spreetail’s existing infrastructure and be displayed live on their business systems. These changes were not made due to time constraints and instead we spent time looking to fulfill Spreetail’s vision of being able to capture an item fast enough that a warehouse employee could grab another item off the shelf. We were able to speed up and optimize the camera taking process to be much faster while still taking high quality imagery. Instead of processing the images into a 360 item and integrating into Spreetail’s live systems, we instead sent all of the pictures up to the Spreetail database so that they could be used however.

## Solution Created

The solution created involves both hardware and software components. The hardware consists of an electric turntable, two DSLR cameras, two tripods, a computer tower, and various cables for connecting the hardware components. These components work together to allow control of the DSLR cameras. The software portion consists of a user friendly front end that allows users to capture a preview image from both cameras, enter an item id, start a full 360 capture, select the photos to keep, and then save the images to Spreetail Azure storage. The user can also cancel the 360 capture or restart the process. The front end communicates with the hardware via the Azure Message Service, and the hardware is also running software necessary to control the cameras as well as communicate with the front end.

## Value of Solution

Spreetail will benefit from this project by placing the solution in their photography studio. This solution provides an automated service that can speed up the capture process of products while also providing many images from different angles. All photos taken are of high quality and can be used in a components that allows Spreetail.com users to click and drag and see 360 views of Spreetail’s products. This solution will simplify Spreetail’s product photography process.

# Project Challenges

There were many challenges encountered throughout the project, including finding hardware components that fit the needs of the project, the ability to capture images from two cameras at once, and finding a good way for the front and back ends to communicate. For finding hardware components, we were able to borrow some possible cameras and other components for testing purposes. This gave us an opportunity to research and look into possible project directions, such as webcams vs DSLR cameras. To capture from multiple cameras at once, we first had to find two cameras to experiment with. We went through many hours of testing and code to find the solution, which is calling the cameras by their usbid. To allow the front and back ends to easily and effectively communicate back and forth, we implemented an Azure Message Service, which decouples both ends of the project while also providing fast and simple messaging. This allows the user and the hardware unit to be connected anywhere there is internet access.

# Project Successes

There were many successes in this project that led to the final solution provided today. Brett was able to find the Azure Message Bus Service, which allowed us to communicate between the front and back ends very fast and efficiently. Before, we were sending a command to capture an image and returning that image to the front end in 15 seconds. We can now request a preview image from both cameras and return those images to the front end in 5 seconds. This was a major improvement over our previous ideas and ultimately gave us the time efficiency that we have today.

Another major success was changing the way that we captured images throughout the project. Jared found a way to capture an image, download it, and send it to the front end before taking the next photo. Before, we were taking all of the images first, then downloading them all from the camera, then sending them to the front end. This new change decreased the overall average capture time from 3 minutes and 7 seconds to 1 minute and 49 seconds. It also allowed the user to see the images being taken on the front end as they are taken, rather than watching an empty screen for 3 minutes before seeing the photos populate the screen.

# Project Quality

The main criteria that we used for testing our solution were photo quality, ease of use, and speed of the capture process. To test the simplicity of using our solution, we performed user testing with Spreetail employees that had not yet heard about our project. We asked questions that gave us good feedback and fixes for the front end. This allowed us to see how simple our solution currently was, while also giving us insight as to how to simplify it further. For photo quality, we tested multiple types of cameras throughout the project. We tested the quality of each camera in different lighting environments and provided the sponsor with these images to ensure that the quality of the final solution would be sufficient. For the speed, we made many changes to how we were capturing images throughout the project. We began with capturing all of the images first and saving them on the cameras before downloading all of them to the hardware tower to be sent to the front end. We then changed this to capture images separately with different commands. Finally, we implemented a way to capture an image, download it, and send it to the front end in less time than the previous iterations.

# Future Direction

For the future, there can be multiple units running simultaneously in different warehouses. Right now, there is only functionality for controlling one unit. Spreetail can implement these units in many warehouses to increase the output of photos taken while also automating and simplifying the photography process. Also, the photos that are taken with this new solution can possibly be used in the future to create 3D models of the products being photographed. This would allow users of Spreetail.com to interact with 3D models rather than just a “click-and-drag” approach of viewing products.